

Determination of the Productivity of a Medical Ozone Generator

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It is well known that for the application of the ozone generator in medicine, it must provide an accurate concentration of ozone in the resulting ozone-oxygen mixture and the constancy of a given flow rate of this mixture [1-2]. At the same time, one of the main characteristics of a medical ozone generator is its productivity. This characteristic shows how many grams of ozone can produce a generator for a certain period. To ensure the implementation of known procedures for ozone therapy, the upper limit of the productivity of the medical ozone generator should be at least 50 mg / h. According to the procedures of ozone therapy, the consumption of the ozone-oxygen mixture should be in the range from 0.1 to 1 l / min, and the concentration should not exceed 80 mg / l.

The productivity of the ozone generator depends on a number of parameters that can be divided into the following groups: design parameters (chamber dimensions, material of dielectric, etc.); parameters of the supplied gas (flow rate, temperature, composition, humidity, etc.); parameters of the supplied energy (shape, voltage, frequency). Most of these factors are interrelated and accurately determine their impact on productivity is not possible [3-7]. This fact leads to the fact that it is impossible to calculate the productivity of an ozone generator mathematically. However, the calculation of productivity can be made empirically. Productivity is a function of the following variables

$$P = f(P_c, Q, S, K_g, K_d) \quad (1)$$

where P_c - active power consumed by the generator, Q - flow rate of ozone-oxygen mixture, S - area of the discharge chamber, K_g - coefficient of influence of other parameters on ozone generation, K_d - coefficient of influence of other parameters on ozone decomposition.

A prototype study was conducted. The technique was to determine certain flow rate values of ozone-oxygen mixture, which was determined the real value of productivity of the ozone generator. The concentration of ozone was measured in the laboratory unit "Cyclone", which is designed to determine the concentration of ozone in the gas mixture. Pritsntsip measurement in this device consists in determining the amount of absorbed ultraviolet radiation by ozone. Flow rate of ozone-oxygen mixture was measured with the laboratory rheometer. The graph shows the empirically obtained and calculated ozone generator productivity. Low productivity at up to 0.5 l /

min is due to the limitation on the limiting ozone concentration.

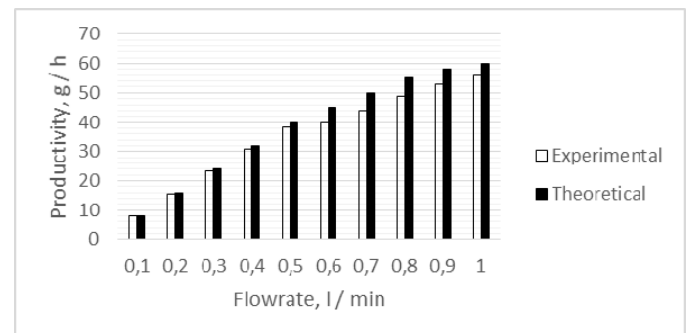


Fig. 1. Productivity of medical ozone generator prototype.

The theoretical calculation of the values was made by an empirically derived formula for a given type of ozone generator. The main values for the calculation were: the voltage on the discharge chamber, the area of the discharge chamber, the distance between the dielectrics in the discharge chamber, the dielectric material, the temperature of the supplied gas. The values of the other parameters that affect the productivity of the ozonator were presented in the form of a static coefficient. The results show that the calculated capacity of the ozone generator differs from the actually obtained by no more than 10%. Consequently, if it is impossible to perform a mathematical calculation of productivity, it is possible to use an empirical method for determining the productivity of an ozone generator.

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